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AUTHORITY
30 Jun 1972, Group-4, DoDD 5200.10; USAFA ltr dtd 11 Apr 1973

CONFIDENTIAL (10) ASTIA 2034

HEADQUARTERS
UNITED STATES CONTINENTAL ARMY COMMAND
Fort Monroe, Virginia

ATDEV-3 471/66(C)(15 Jul 60) 15 July 1960

SUBJECT: Report of Project Nr 2877, "Evaluation of 6.35mm Simplex and Duplex Ammunition" (U)

TO: Chief of Research and Development
Department of the Army
Washington 25, DC

1. (U) A copy of subject report is inclosed.

2. (U) This headquarters concurs in the conclusions of the US Army Infantry Board in paragraph 7 of the inclosed report.

3. (C) This headquarters recommends that:

a. No further consideration be given to the development of caliber 6.35-mm ammunition for the conventional rifle role.

b. To provide the lightest and best weapon/ammunition combination for the APHHW, development should continue to include the optimum flechette, small caliber high velocity, or other ammunition feasible within the state of the art and should not be restricted to the type of ammunition discussed in this report.

4. (U) It is requested that this headquarters, ATTN: Deputy Chief of Staff for Materiel Developments, be notified of action taken.

FOR THE COMMANDER:

William A. Keil

1 Incl
(Over)

WILLIAM A. KEIL
Major, AGC
Asst Adjutant General

1 Incl
Rept of USA Inf Bd,
Proj Nr 2877, 21 Jun
60, W/anx A-C

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CONFIDENTIAL

21 JUN 1960

HEADQUARTERS
UNITED STATES ARMY INFANTRY BOARD
FORT BENNING, GEORGIA

REPORT OF PROJECT NR 2877
EVALUATION OF 6.35MM SIMPLEX AND DUPLEX AMMUNITION (U)

1. (U) AUTHORITY:

a. Directive. Ltr, ATDEV-3 471/73(C) (22 Oct 59), Hq USCONARC, 22 Oct 59, subject: "Evaluation of 6.35mm Simplex and Duplex Ammunition (U)."

b. Purpose. To determine whether the 6.35mm ammunition has sufficient military value under temperate weather conditions to warrant further development.

2. (U) REFERENCES:

a. OCM Item 34511, OCOFORD, DA, 14 Nov 52, subject: "SMALL ARMS AMMUNITION, STANDARDIZATION OF."

b. Report of Project Nr 2787, US Army Inf Bd, 27 Mar 58, Evaluation of Small Caliber High Velocity Rifles-Armalite (AR-15) (U).

c. Report of Project Nr 2787, US Army Inf Bd, 14 Jul 58, Evaluation of Small Caliber High Velocity Rifles-Winchester (U).

d. Research and Development Annual Project Report, Vol II, Research and Development Project Task Card, Salvo Rifle Ammunition (U), Index Nr TS 1-2(1), 31 Dec 58.

e. Report of Project Nr 2812, US Army Inf Bd, 20 May 59, Evaluation of NATO 7.62mm Duplex Ammunition (U).

f. Report of Project Nr 2853, US Army Inf Bd, 17 Aug 59, Evaluation of .30 Caliber Duplex Ammunition (U).

g. Report of Project Nr 2876, US Army Inf Bd, 18 Mar 60, Evaluation of Single Flechette (U).

h. DA Project Nr 5-04-05-002.

i. CDOG subparagraph Nr 238.

3. (U) DESCRIPTION OF MATERIEL:

a. Test.

(1) Cartridge, Ball, Caliber .250 (6.35mm), FA T116E1, Lot Nr FA 6.35X2627, hereinafter referred to as the short test round, contains a copper-jacketed steel-core projectile weighing 68.8 grains. The over-all length of the cartridge is 2.28 inches and it contains 30.2 grains of powder (Annex C-1 and C-2).

(2) Cartridge, Ball, Caliber .250 (6.35mm), FA T124, Lot Nr FA 6.35X2643A, hereinafter referred to as the long test round, contains a copper-jacketed steel-core projectile weighing 68.8 grains. The over-all length of the cartridge is 2.48 inches and it contains 32.9 grains of powder (Annex C-1 and C-2).

(3) Cartridge, Caliber .250 (6.35mm), Winchester Duplex Ammunition, Lots Nr 308723 and 299949, hereinafter referred to as the duplex round, contains two copper-plated steel projectiles, each weighing approximately 53 grains, loaded in tandem. The over-all length of the cartridge is 2.27 inches and it contains 33.7 grains of powder. Upon firing, the front and rear projectiles should provide controlled dispersion characterized by an accurate front projectile which strikes on the point of aim and a displaced rear projectile which should impact in a random circular pattern around the point of impact of the front projectile. The displacement of the rear projectile from the point of impact of the front projectile is obtained by inclining the heel plane of the rear projectile at an angle (Annex C-1 and C-2).

b. Control. Cartridge, Ball, 7.62mm, M59, hereinafter referred to as the control round, is the standard NATO 7.62mm cartridge. It contains a copper-jacketed steel-core projectile weighing 147 grains and 45 grains of powder (Annex C-1 and C-2).

c. Weapons. Throughout this evaluation, the test ammunition was fired from 5-shot, bolt-action, Remington, Model 722, Caliber .222 Rifles which had been modified to caliber .257. The control ammunition was fired from standard M14 rifles.

4. (C) BACKGROUND:

a. The test ammunition was developed under the SALVO ammunition program. This program is too extensive to review in detail, however, a comprehensive background of the program may be found in ref d, par 2.

b. After being engineering tested at Aberdeen Proving Ground, test ammunition was furnished this Board for evaluation in July 1959 (Simplex) and December 1959 (Duplex).

c. Paragraph 4e of the test directive stated that the results of this Board's evaluation of the 6.35mm and single flechette ammunition would influence the decision as to the type of ammunition to be used in the direct fire role of the All Purpose Hand Held Weapon (APHHW). It further directed that the report contain comparative data on other available small arms ammunition/weapon systems. In accordance with these instructions, appropriate results obtained during the evaluation of the single flechette (ref g, par 2) are included in Annex A and discussed in par 6 of this report. Also results that were obtained previously in the evaluation of the .22 caliber high velocity ammunition/weapon systems (ref b and c, par 2) are discussed in par 6 of this report.

d. The test items are not proposed for tripartite standardization.

5. (C) SUMMARY OF TESTS: All test items were tested to determine and compare their physical characteristics, semiautomatic accuracy, and penetration characteristics. In addition, firing was conducted under transition and trainfire firing conditions to determine if any substantial combat advantage would be gained through the substitution of duplex loads for conventional single bullet loads. A long duplex round was not furnished for evaluation; therefore, the long simplex round with which it would have been compared was not subjected to these latter two tests. Results of tests were as follows:

a. PHYSICAL CHARACTERISTICS. All test rounds were shorter and lighter than the control round. The single flechette was significantly lighter than either the test or control rounds.

b. ACCURACY-SEMIAUTOMATIC FIRE. There was no significant difference in the accuracy of the control round and the test rounds except at 500 meters where the test duplex round was inferior to all other test rounds and the control round. The single flechette was inferior in accuracy to the test rounds and the control round.

c. PENETRATION.

(1) The penetration characteristics of the short and long test rounds were satisfactory in all media except mild steel plate.

(2) The penetration characteristics of the duplex round were either unsatisfactory or poor in all media.

(3) The penetration characteristics of the single flechette were satisfactory in all media except sand.

d. TRANSITION FIRING.

(1) The duplex round was superior to the short test round and the control round in total projectile hits. However, this was due to both

projectiles of the same round hitting the targets at close ranges, which constituted an "overkill".

(2) The duplex round was slightly inferior to the short test round and the control round in total targets hit.

e. TRAINFIRE RECORD COURSE.

(1) The duplex round was superior to the short test round and the control round in total projectile hits. However, this was due to both projectiles of the same round hitting the targets at close ranges, which constituted an "overkill".

(2) The duplex round was superior to the short test round and inferior to the control round in total targets hit.

6. (C) DISCUSSION:

a. The performance of the single projectile test ammunition in this evaluation was generally satisfactory for the conventional rifle role. However, since this round is a candidate for the direct fire role of the APHHW system it must also be evaluated in this respect. The concept of the APHHW system visualizes the combination of an area fire and a direct fire weapon. Aside from the actual performance characteristics of each individual weapon system, the most important consideration is the over-all size and weight of each type system to be combined. Since a military weapon has not yet been developed for the test ammunition, its exact size and weight cannot be determined. However, through experience gained with other ammunition/weapon systems it is possible to estimate the size and weight of a 6.35mm ammunition/weapon system. It is felt that such a system would be only marginally lighter and smaller than the present M14 rifle/ammunition system and therefore has limited potential for meeting the weight restrictions of the APHHW system. However, should the development of lighter weight systems for the APHHW prove unsuccessful, the weight advantage and comparable performance of the test ammunition would favor its consideration over the 7.62mm weapon/ammunition system. Two other possible candidates for this role were evaluated previously by this Board. The first of these was the single flechette (ref g, par 2). This round is much lighter than the test or control ammunition. The weapon system for this round has not yet been developed, however, the developer claims that it should be significantly lighter than the weapon system for either the test or control ammunition. The single flechette, which is of the discarding sabot type, has an undesirable danger zone caused by the dispersion of the sabot particles and poor single round accuracy characteristics. These difficulties must be overcome before the single flechette will be suitable for the direct fire role of the APHHW system. The other possible candidate for the direct fire role of the APHHW system is the .22 caliber high velocity ammunition tested by this Board in 1958 (ref b and c, par 2). Two weapon

systems were tested with this ammunition. These ammunition/weapon systems were lighter and smaller than the test and control systems evaluated in this project. The performance of the .22 caliber ammunition, a commercial type round, was satisfactory except for its penetration characteristics which need to be improved to make the round fully suitable for military use. It is felt that the discrepancies associated with conventional high velocity ammunition could be overcome more readily than those of the flechette ammunition which is in the early stages of development. Furthermore, the savings in weight of the .22 caliber conventional system should compare favorably with that contemplated in the flechette weapons system. Consequently, it is strongly urged that developmental efforts to perfect a suitable round for the direct fire role of the APHHW system include the smallest caliber of conventional type ammunition that the present or the future state of the art indicates is feasible.

b. The test results obtained with the duplex test round in this evaluation were substantially the same as those obtained in previous duplex ammunition tests (ref e and f, par 2). These results indicated that there was a loss of accuracy and penetration with the duplex round, and although there is an improvement in the total projectile hits with duplex, this does not constitute an increase in hit probability which is basically a measure of the number of targets hit for a given number of rounds fired.

7. (C) CONCLUSIONS: The US Army Infantry Board concludes that:

a. The Cartridges,Ball, .250 (6.35mm), FA T116E1, Short, and FA T124, Long, offer only marginal advantages over the Cartridge, Ball, 7.62mm, M59.

b. The Cartridges, Ball, .250 (6.35mm), FA T116E1, Short, and FA T124, Long, have less potential for fulfilling the direct fire role of the APHHW system than do the single flechette or the .22 caliber high velocity ammunition/weapon systems.

c. The Cartridges, Ball, .250 (6.35mm), FA T116E1, Short, and FA T124, Long, have marginally more potential for fulfilling the direct fire role of the APHHW system than does the present 7.62mm, M14 Rifle ammunition/weapon system.

d. The Cartridge, .250 (6.35mm), Winchester Duplex, offers no significant advantages over the Cartridge, Ball, .250 (6.35mm), FA T116E1, Short, or the Cartridge, Ball, 7.62mm, M59

8. (C) RECOMMENDATIONS: The US Army Infantry Board recommends that:

a. No further consideration be given to the development of caliber 6.35mm ammunition for the conventional rifle role.

b. Further development of the 6.35mm ammunition for the direct fire role of the APHHW system be continued only in the event that discrepancies in smaller caliber ammunitions cannot be overcome.

c. Developmental efforts be continued to obtain a more suitable round for the direct fire role of the APHHW system. This effort should include the smallest calibers of conventional ammunition feasible within the present or future state of the art, and should not be restricted to the types of ammunition discussed in this report.

HENRY B. KUNZIG
Colonel, Infantry
President

ANNEXES:
A. Details of Test (Omitted)
B. Findings (Omitted)
C. Photographs, C-1 and C-2 (Omitted)

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